

IN WHAT CLASS OF WOUNDS SHALL WE USE DRAINAGE?¹

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IT has been stated upon high authority that the drainage of wounds marked an era of advance in the methods of wound-treatment equal to that of the introduction of antiseptics. The differences of opinion which still pertain are so marked that the question of drainage in operative wounds is one of primal importance, and I have presumed to call attention to it, in the hope that our surgical science is, at least, so advanced as to permit the formulation of certain general rules for guidance. It may be accepted that the object of drainage is to safely remove deleterious substances from a wound which, if allowed to remain, will in a greater or less degree, retard cure, or even endanger life.

These substances consist, on the one hand, of blood, serum and devitalized tissues, and on the other, of vital organisms, known earlier as ferments, consisting of various forms of bacteria which utilize these materials as food, and may reproduce, with a rapidity and degree almost beyond comprehension. These low orders of vegetable organisms not only thus become dangerous in themselves, but they generate a chemical poison which may be sufficient in amount to produce death.

To what degree are the living tissues endowed with a resistant power for self-protection from such danger, is a question to be answered with difficulty, perhaps never subject to precise solution. It is settled beyond doubt that the healthy tissues have a resisting power to prevent, to a certain extent, the

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invasion of bacterial infection, and that this is, in a more or less direct ratio to the physical vigor of the individual, age, condition, etc. It will also not be questioned that an occasional bacterium, implanted upon healthy tissues, will not germinate, and it may be formulated that when the vital resistant power is greater than that of the foreign element, the latter will not thrive. Such illustrations are often met in wounds subject to local infection only, where the recovery is slow and the resulting abscess causes the expulsion of the foreign material, healthy granulating cells at length filling in and uniting the tissues.

It is also clearly established that this same vital force is quite capable of dealing with, and in the end, utilizing for repair considerable effusions of blood and serum, as well as broken down tissues, so often seen in subcutaneous wounds, simple fractures, and other severe injuries. However, change the conditions by the introduction of a micrococcal infection, as in a compound fracture, and it is quite possible that this same resistant power may be no longer able to save the general organism from destruction, and death may result from septic poisoning.

From this brief review of well known facts, it is obvious that the real object of drainage is not so much the removal of the serum, blood, and devitalized tissue, as it is to remove any possible bacterial infection which may have invaded the wound, for it is quite impossible to divide and rejoin tissues without the effusion of blood and serum, and in a greater or less degree devitalizing the adjacent tissues. Since these are very important factors, it is of the first consideration on the part of the surgeon that he minimize, as much as possible, these conditions for the reason that they render it very probable that the introduction of bacterial *seed* into such a *soil* will be followed by direful results.

Is the present state of operative procedure sufficiently accurate to warrant the assurance that such complications are not to supervene, is the question which must first be satisfactorily answered, before we are in a position to determine at all positively, when we are to use, if always, or not at all, the drainage tube, and hope thereby to remove the fermenting

material so dangerous if allowed to remain. It is certainly clear that the experience of the last twenty years has been leading to the solution of this problem, until now it seems demonstrated beyond a doubt that an *aseptic* wound may be made in *aseptic* tissues and maintained *aseptic*, until restoration is complete. If this is true, the *modus operandi* of modern wound treatment must be mastered as the ritual service of a higher religion, before the surgeon is competent to enter upon his duty in the field of operative surgery. This portion of the subject would lead one too far from the theme of present consideration, but, fortunately, the members of this society need little instruction in this direction.

If aseptic conditions are maintained, then we may safely conclude that the drainage of the wound will not be necessary, and if unnecessary, certainly undesirable. At the best, the drainage tube is a foreign body and its presence in the wound prevents primary union of that portion of the tissues which encloses it. It keeps the wound, to a certain extent, an open one, and, as such, makes secondary infection so probable that the most careful dressings are advised to absorb and disinfect secretions and prevent atmospheric contamination. In an aseptic wound, after the removal of the tube, the final closure of the tract is comparatively slow, and by granulation. These are well recognized objections, and efforts have been made to overcome them by many ingenious devices. The bone drainage tubes are of service to this end, since after serving the purpose of a drain for a time, they soften and, as broken-down material, escape into the dressings. A modification of these tubes has been made by Dr. Weeks, of Portland, Me., possessing certain advantages over bone, in the use of the arteries from animals which have been aseptically prepared. They serve an excellent purpose when such drains are required.

If drainage is to be discontinued in aseptic wounds, it must be accepted that all possible care is to be exercised in having *as little devitalized tissue as possible*, and in *evenly coapting the divided parts*. The wound should be clean and dry. The different layers of the tissues should be joined with as little injury to them as possible, and the external wound protected from infection. This I have found best carried into effect by

irrigation, a minimum of sponging, and joining the tissues by light running buried animal sutures, preferably fine tendon. The skin is evenly coapted by a similar suture taken from within outward through the deeper layer only. Then the wound is sealed with a germ proof layer of iodoform collodion, reinforced by a few fibres of cotton. Such wounds go on rapidly to repair without œdema of the tissues, pain, or tenderness. The resulting cicatrix is minimized, of much importance in facial wounds, and often is scarcely, after some weeks, to be recognized.

Are all aseptic wounds to be thus treated? I unhesitatingly say, yes, even to the major amputations, and in a large proportion of laparotomies. Can such large wounds be made and maintained aseptic? Without a doubt, as experience abundantly proves; however, by the most scrupulous of aseptic measures. When in doubt, it may be better to drain large wounds, but I cannot myself question that he who uses the drainage tube in aseptic wounds, unconsciously, however it may be, thereby, in a measure at least, confesses his lack of confidence in his belief and ability to maintain an aseptic condition of wounds.

The wound which is cleansed with difficulty from blood, or where there may be possibly unsecured bleeding points, may become an exception to the above rule, even if aseptic, but here the drainage-tube, when used, is for quite another purpose; in order to point out secondary hæmorrhage, as after severe abdominal operations with many injured vessels. I cannot myself, however, doubt but that it is far better to use especial precautions to control hæmorrhage before closure of the wound, rather than rely upon such an imperfect indicator of subsequent complication. As a matter of fact, I find, in my last forty abdominal sections, I have not once used drainage, and have noted no reason to regret not doing it.

In *septic* wounds we have entirely other conditions, and here we shall find abundant reason for the use of drainage. In an abscess, as illustration, the proliferated wall of protective cells is often invaded by colonies of bacteria, and the simple washing with antiseptics is not sufficient to destroy fermentation. Here it is of much importance to remove as rapidly as possi-

ble the albuminoid secretions and broken debris, to allow the cavity to contract, and when this takes place the surrounding tissues rapidly become of increased vitality, while the bacteria, robbed of nutrition, soon die and disappear.

When tissues, otherwise healthy, have become contaminated by infective material, as, for instance, the rupture of a pustule in the pelvic cavity, we can never be certain that our antiseptic washes have disinfected all the peritoneal folds, even if applied with care, and here drainage should be used. The irritation which follows such operations will cause serous effusions and this, with the blood and dead tissues, always in some degree present, will furnish abundant pabulum for bacterial growth. Here it is important, not only to use a drainage-tube, but to be explicit in the care of the same, for at least the first two days after operation. Properly used, it should be long enough to reach to the bottom of the cavity of the pelvis, to the posterior cul-de-sac. It should contain lateral openings, and the attendant in charge should for the first hours empty the same every few minutes by the use of absorbents, cotton on wire gently used answering every purpose. This makes, as it were, a continuous flow from the surrounding tissues toward the bottom of the drain and removes the fluids before time for fermentation has elapsed. After twenty-four hours the quantity will have greatly diminished and a capillary drain of gauze will be sufficient, changed occasionally. It is better, when all goes well, to remove the tube altogether by the third day. Occasionally small portions of omentum are drawn into the openings of the drainage-tube by suction, and thus closure takes place, but rotation of the tube is quite sufficient to disengage them. When tubes are used, antiseptic absorbent dressings are of importance, and position should be made available as far as possible in aiding the outflow of the secretions.

If the conclusions above arrived at are correct and based upon scientific data, in what way are we able to explain the great differences of opinion and practice at the present? At the recent International Medical Congress in Berlin, both Mr. Tait and Dr. Bantock expressed their disbelief in germs as an

important factor in wound treatment, while they strongly urged the importance of the early and rapid removal of blood, serum, and devitalized tissue from wounds. On this account, they not only use the drainage-tube as in common practice, but predicted its more general adoption in the early future. Mr. Tait very properly emphasized the power of the tissues to protect themselves, when vitalized, if placed in favorable conditions, and I take the greatest pleasure in seconding the views of this noted surgeon; to use an illustration drawn from agriculture, the proper care of the *soil*, while I trust he will not be forgetful of the *seed*, which is, after all, an equally important factor in the direful harvest.

The conditions for growth must be fitting. To destroy weeds, as well as to grow the grain, a primal knowledge of their reproduction is necessary. As well think of reading an essay upon agriculture over a peck of corn, poured upon Boston Common, and expect an abundant harvest, as to confidently look for good results in wound treatment without a knowledge of all its possible factors. The *seed* and the *soil* and the varying conditions of *each* must ever be kept in consideration. When in doubt of infection left in a wound, especially when its character will be likely to be attended with an abundant albuminoid secretion, drain; but let the surgeon ever remember that the highest ideal condition of wounds is their restoration to, as nearly as possible, the normal relations of the tissues, and their retention at rest in an aseptic condition. This should, in the great majority of wounds, render drainage not only unnecessary, but when applied it will be a positive detriment and a source of danger. Complete closure of an aseptic wound by buried aseptic animal sutures, retained at rest by a germ-proof dressing, comes nearer to the ideal than any method yet advised. There is no fear of hæmorrhage in a wound thus closed; if aseptic there is no further danger from infection. Clumsy antiseptic dressings are entirely avoided; little subsequent care is requisite on the part of the surgeon or attendant, and a patient, relieved of fear from the suffering from removal of stitches, free of pain, goes on to a rapid convalescence. I am assured that the better knowl-

edge of the conditions of wounds will restrict the use of the drainage-tube to septic wounds, and that operative wounds in aseptic tissues will be aseptically maintained by primary closure without drainage.